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Prevention of Disabling Back Injuries in Nurses by the Use of Mechanical Patient Lift Systems

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ABSTRACT: Occupational back pain in nurses (OBPN) constitutes a major source of morbidity in the health care environment. According to the National Institute for Occupational Safety and Health (NIOSH), occupational back injury is the second leading occupational injury in the United States. Among health care personnel, nurses have the highest rate of back pain, with an annual prevalence of 40–50% and a lifetime prevalence of 35–80%. The American Nursing Association believes that manual patient handling is unsafe and is directly responsible for musculoskeletal disorders encountered in nurses. It has been well documented that patient handling can be done safely with the use of assistive equipment and devices that eliminate these hazards to nurses that invite serious back injuries. The benefit of assistive patient handling equipment is characterized by the simultaneous reduction of the risk of musculoskeletal injury to the nursing staff and improvement in the quality of care for patient populations.

To understand the cause of disabling injuries in health care workers, several factors must be considered, including the following: (1) anatomy/physiology of the back, (2) risk factors, (3) medical legal implications, and (4) prevention. Among nurses, back, neck, and shoulder injuries are commonly noted as the most prevalent and debilitating. While mostly associated with dependant patient care, the risk for musculoskeletal injury secondary to manual patient handling crosses all specialty areas of nursing. The skeletal defects of an abnormal back make the back more susceptible to occupational injury, even under normal stress conditions. Workers compensation guidelines for occupational back injury differ in public and private health care

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sectors from state to state. Nursing personnel should be reminded that the development of back pain following occupational activities in the hospital should be reported immediately to the Occupational Health Department. A nurse's failure to report OBPN immediately has resulted in numerous denials of claims for rehabilitation and compensation that nurses deserve. Experts believe that training in proper body mechanics does not prevent back injury. Consequently, focus has been placed on other innovative injury prevention programs, including the use of engineering controls as well as the "lift team" method. Ergonomics involves the use of mechanical devices (e.g., walking belt and mechanical hoist) to aid in patient lifting and transferring tasks.

Guldmann Inc. has devised ceiling lift systems and slings during the past 20 years. They have successfully completed thousands of installations worldwide, covering a wide range of challenging conditions and complex environments. The Guldmann ceiling-mounted hoist system consists of a wide range of lifting units, rail components, and a complete assortment of lifting slings and accessories. Its sling is made of polyester, which is characterized by its strength and elasticity. It retains its shape and is dirt repellent and easy to maintain. The Guldmann network has one of the largest and indisputably most experienced group of certified installers in the United States.

The "lift team" method was devised to remove nursing personnel from the everyday task of moving patients. This type of intervention assumes that lifting is a specialized skill to be performed only by expert professional patient movers who have been thoroughly trained in the latest lifting device techniques.

KEY WORDS: occupational back injuries in nurses, American Nurses Association, manual patient handling, musculoskeletal disorders, assistive patient handling equipment, ergonomics, risk factors, medical legal, workers compensation guidelines, Guldmann Inc., ceiling lift systems, slings, certified installers, lifting

I. INTRODUCTION

Occupational back pain in nurses (OBPN) constitutes a major source of morbidity in the health care environment. According to the National Institute for Occupational Safety and Health (NIOSH), occupational back injury is the second leading occupational injury in the United States.[1] Among health care personnel, nurses have the highest rate of back pain, with an annual prevalence of 40–50% and a lifetime prevalence of 35–80%. Nurses also have the highest incidence rate of workers' compensation claims for back injuries.[2-6] OBPN is an even greater problem than published statistics indicate, because nurses perceive back pain as an inevitable part of nursing practice.[7] The financial implications of this costly injury have been estimated to be as high as $16 billion annually in the United States.[8] The additional cost to employers of slowed production, employee turnover, and medical cost reimbursement is estimated at $10 billion annually.[9] In recognition of the enormous dangers to nursing of occupational back pain, the American Nursing Association has published a landmark position statement: Elimination of Manual Patient Handling to Prevent Work-Relation Musculoskeletal Disorders.[10]

II. ETIOLOGY

To understand the cause of disabling injuries in health care workers, several factors must be considered, including the following: (1) anatomy/physiology of the

back, (2) risk factors, (3) medical legal implications, and (4) prevention.

II.A. Anatomy/Physiology of the Back

Among nurses, back, neck, and shoulder injuries are commonly noted as the most prevalent and debilitating.[11] The spine is a complex structure consisting of 24 mobile and five immobile vertebrae. Pads of soft tissue—vertebral discs—serve as a separation of these vertebrae. These discs are made of a colloidal gel and allow movement while absorbing mechanical shock. Ligaments run between the vertebrae and along the entire spine, maintaining structural integrity. Anterior and posterior ligaments resist stress to the spinal column through the prevention of shearing action as well as excessive movement. An inherent structural weakness of the spine exists in the lumbar area, where the longitudinal ligament begins to narrow. Unfortunately, the lumbar area is also where the greatest stress is placed on the spine.[12]

Simultaneous interaction of the spine and back provides structural support for the body, protects the spinal cord, and provides flexibility of motion, strength, and balance.[13] Abdominal and thoracic musculature contribute to this support by providing strength to the spine and back. A healthy posture results when the three curves, lumbar, thoracic, and cervical, meet in a midline center of gravity to balance the weight distribution. This balance then protects the individual from sustaining a back injury.

The extensibility of the ligaments, elasticity of the articular capsule, fluidity of the disc, and elasticity of the muscles determine the range of motion permitted by the normal spine. When lifting an object, the pelvis and ligaments of the spine sustain the stress until 45° of flexion is reached. Any further flexion results in the use of back muscles. Garg et al.[14] determined that, during one of their busiest hours, nurses flexed forward more than 72° every 53 seconds. It was also found that these same nurses spent more than 13 minutes of this hour in a bent-forward position of 36° or more, placing them at high risk for development of OBPN.

II.B. Risk Factors

While mostly associated with dependant patient care, the risk for musculoskeletal injury secondary to manual patient handling crosses all specialty areas of nursing. Consequently, no nurse is effectively free from the risk of injury. The impact on the nursing workforce may result in adverse consequences at the organizational level, as well as through increased absenteeism, lost work time, burnout, decreasing retention, high turnover, and threatened recruitment. In addition, the occurrence of musculoskeletal injuries may have a discouraging effect within the context of nursing shortage, aging workforce, and waning number of professional entrants.[15]

There are three possible origins of back injury: abnormal strain on a normal back, normal stress on an abnormal back, and normal stress on a normal back that is unprepared for the stress.[12] In 1991, the Occupational Safety and Health Administration issued guidelines to identify the following six risk factors in the development of a back injury: (1) poor body mechanics, including continued bending over at the waist, lifting from below the knuckles or above the shoulders, and twisting at the waist, especially while lifting; (2) lifting or moving objects of excessive weight or asymmetric size; (3) prolonged sitting with poor posture; (4) lack of adjustable chairs, foot rests, body supports, and work surfaces at work stations; (5) poor grips on handles; and (6) slippery footing.

Maintenance of an awkward posture places abnormal strain on a normal back. Unfortunately, nursing personnel frequently work in awkward positions or spend much of their time in a standing position with arms fully extended. This awkward positioning of the body is not initially fatiguing because of maintenance of structural integrity by the ligaments and muscles of the back. However, spending prolonged time in awkward positions or prolonged standing result in

excessive stress to the ligaments with accompanying muscular contraction, leading to fatigue, strain, and discomfort.[13] An erect posture places the heavy part of the trunk on top of a small base. Prolonged standing can put strain on the ligaments and musculature of the back, which may cause cumulative trauma. In addition, fatigued muscles no longer serve their protective function and may add to the risk of acute trauma.

The skeletal defects of an abnormal back make the back more susceptible to occupational injury, even under normal stress conditions.[16] Although the proper body mechanics may be used; the stress on these abnormal structures is still excessive. Back pain from overstretching of muscles and ligaments results. Development of this type of back injury remains chronic as the restrictions of bad movement prevent normal functioning.

A normal stress on a normal back structure imposed by unexpected circumstances is the most common type of back injury among nursing personnel. For example, patients may not help pull or push with the nurse when the nurse expects them to, or a patient may fall, pulling and twisting on the nurse's back. Because this movement is sudden, the nurse does not have adequate preparation time to protect the back structures from injury. Any diminished muscle strength, power, and/or joint flexibility places the nurse at a great disadvantage during these sudden movements. Excessive movements that exceed the physiologic range of motion may result in contraction of the back, causing the microscopic or macroscopic tissue damage that ultimately results in back injury.

According to NIOSH lifting guidelines, the maximum recommended weight to be lifted by women in the 90th percentile of strength is 46 lbs.[17] Furthermore, this weight figure assumes smooth lifting, moderate width objects, unrestricted standing posture, favorable environments, good footing, consistent load, lowering tasks, and lifts done alone with no other work involved. None of these specifications may hold true all the time for the lifting tasks performed by nursing personnel. Nurses must work with patients of different sizes, shapes, and weight and must deal with the sudden and unpredictable changes in the weight (falls) in awkward positions. Although this guideline was not developed with human parameters in mind, it serves as reference to understand the potential for injury among nursing personnel. For example, when two nurses lift a patient weighing 140 lbs, each is lifting approximately 70 lbs, which is 24 lbs over the limit set by NIOSH for women in the 90th percentile of fitness.

In the new landmark report from the American Nursing Association,[10] it points out that manual patient handling specifically refers to tasks such as lifting, transferring, and repositioning of patients without the use of assistive devices. Performing these manual patient handling efforts places nurses at increased risk for musculoskeletal disorders. They point out again that the risk can be attributed to several factors, including weight of load, patient characteristics, awkward posture, positioning, and environmental factors. They emphasize that these efforts to quantify scientifically allowable levels of weight for lifting cannot be generalized to the nursing workforce because patients' bodies have asymmetric distribution of weight and do not posses available, stable areas to grip, thereby making it difficult to hold the patient's weight close to the nurse's body.[18] It must also be pointed out that there may be occasions when patients are agitated, combative, or nonresponsive or can offer limited levels of assistance, enhancing the risk for nursing injury.[19]

II.C. Medical Legal Implications

Workers' compensation guidelines for occupational back injury differ in public and private health care sectors from state to state. For example, for state hospital employees in the Commonwealth of Virginia, the Occupational Health Department (OHD) immediately assigns the nurse to a physician for evaluation of the injury. If a disc is found to be protruding, the nurse is placed on automatic disability. If the nurse sustains a back strain or any

other nondisabling back injury, a rehabilitation program is begun and the nurse is placed on an adjusted light duty schedule to prevent further aggravation of the injury. After 12 weeks, the nurse is referred to a specialist for evaluation of progress. If the nurse cannot return to work after this period, then the state organization will terminate the employee, and it is the employee's responsibility to follow up with the state organization's insurance carrier to collect workers' compensation. If compensation is granted, then the nurse will receive full pay for the first 90 days from the date of the injury and 66% pay tax-free for up to 5 years following the injury. In the private sector of health care, the policy is mandated by each individual organization, which sets its own protocol for handling occupational injuries.

Nursing personnel should be reminded that the development of back pain following occupational activities in the hospital should be reported immediately to the OHD. If the back injury occurs when the OHD is closed, the nurse should make arrangements so that he or she can be seen as soon as possible in the Emergency Department. A nurse's failure to report OBPN immediately has resulted in numerous denials of claims for rehabilitation and compensation that nurses deserve.

II.D. Prevention

In the past, most programs for back injury prevention among nursing personnel focus on proper lifting techniques, body mechanics, and back care.[20] Nurses were commonly led to believe that the primary way to prevent back injuries was to always use proper body mechanics. However, the fact remains that some tasks were so stressful to the body that even when proper body mechanics were used, a back injury resulted.[7] Further, some disagreement exists among health care personnel concerning which techniques were best for patient transfers. Often methods that are acceptable in one health care institution were considered inappropriate in another.[21] Although instruction on proper body mechanics in lifting and transferring patients was believed to have a prophylactic value, no scientific evidence existed that it reduced the frequency of OBPN.[22] Experts believe that training in proper body mechanics does not prevent back injury. Consequently, focus has been placed on other innovative injury prevention programs, including the use of engineering controls as well as the "lift team" method.

As noted in the landmark report from the American Nurses Association, engineering controls are the best defense for worker protection and can be effectively applied to patient handling. Technology has been developed to reduce the risk of exposure to occupational back injuries. The healthcare industry must embrace the evolution of these revolutionary technological developments in terms of their value to the delivery of quality patient care. Specialized equipment exists to assist in patient handling tasks, and the selection of products continues to enlarge. Examples of patient handling equipment include full-body sling lifts, stand-assists lifts, lateral transfer devices, and friction reducing devices. These innovative assistive technologies remove the manual dimension of patient handling with the use of assistive lift technology. The use of assistive equipment relieves the caregiver of the total effort and risk associated with patient handling duties.[19,23] The availability and utility of assistive equipment eliminated the need to engage in total manual patient handling. Although some form of patient handling must be undertaken by some nurses, it should be limited to assisting patients while using assistive equipment. There may be situations where manual patient handling cannot be avoided; nurses may be presented with exceptional or life threatening situations prohibiting the use of assistive patient handling equipment. Other exceptions include the care of the pediatric (infant or small child) or small patients. The American Nurses Association stresses that in any and all cases, efforts toward patient handling should be minimized without compromising patient care or exceeding the abilities and skills of the nurse.

II.E. Ergonomics

Ergonomics involves the use of mechanical devices (e.g., walking belt and mechanical hoist) to aid in patient lifting and transferring tasks. It has been suggested that ergonomic application to patient care may lead to less OBPN.[22] In one ergonomic study conducted by Garg and Owen,[24] in which a combination of the walking belt and mechanical hoist was used, the back injury prior to intervention was 83 per 200,000 work hours. After the intervention, the incidence of injury was cut, almost in half, to 47 per 200,000 work hours. More importantly, that same study showed a decrease in the number of lost and restricted work days among nursing personnel during the time of intervention. The decrease in severity rate was attributed to less serious OBPN. This type of intervention also allows for the use of only one nurse to perform the transfer, because the mechanical device performs all of the work. The only disadvantage to using these mechanical patient-handling devices is the longer transfer time.

1. Mechanical Patient Lift System

Guldmann Inc., Tampa, Florida, has devised ceiling lift systems and slings for the past 20 years. They have successfully completed thousands of installations worldwide, covering a wide range of challenging conditions and complex environments. Ceiling lifts travel smoothly and quietly throughout the rail system, a customized system built of modular components that fit together seamlessly. These components can be combined to form any size ceiling track system, room covering system, or combination of both. The rails can be mounted on the ceiling or wall.

The modular components are easy to handle during transport and installation. A wide selection of mounting brackets for wall or ceiling ensures a solid installation in all situations.

Guldmann delivers both products and systems, plus consultation and training, to obtain the best possible use and operation of its systems. Their experienced consultants and installers will plan and install the system with optimum use of space.

2. Ceiling Hoist Systems

The Guldmann ceiling-mounted hoist system consists of a wide range of lifting units, rail components, and a complete assortment of lifting slings and accessories. Using their components and parts, it is possible to design a ceiling mounted system that could be adapted to both individual requirements and the existing environment. The system is available as small free-standing, self-sustaining, and removable units or as wall- or ceiling-mounted systems.

A ceiling-mounted hoist from Guldmann Inc. ensures that the user will experience increased comfort, safety, and mobility. Fewer injuries, less attrition, and increased efficiency provides healthcare workers with more time to care and increased satisfaction.

A ceiling-mounted system does not occupy any floor space. It requires less space for operation, is never in the way, and is always available. A customized ceiling lift system will improve the efficiencies of lifting and transferring activities, resulting in more free time during the workday, allowing the healthcare worker to care for patients. The ceiling-mounted system can be installed in private homes, in hospitals, in care institutions, in mobile homes, and in connection with equestrians, swimming pools, therapies, etc.

The GH2 ceiling-mounted lift is a new generation of the single-hoist system. The hoist hangs directly under the rails and lifts the user with the help of a lifting hanger to which the sling is attached (Fig 1). We have been favorably impressed by either the GH2 ceiling hoist or the GH2+2 ceiling hoist with drive motor.

GH2 ceiling hoist. The GH2 hoist combines high-capacity lifting and functions with an attractive, discreet design (Fig. 1). Although it weighs less than 20 lbs, the GH2 can lift up to 440 lbs. For greater lifting capacity, the DH2000 H (max 520 lbs) or the DH4000 (max 660 lbs) hoist can be used. The

GH2 has powerful batteries that can automatically be recharged on an ongoing basis or when the hoist is located in specific areas in the rail system, depending on the choice of recharging system and rail profile. The hoist has a built-in battery status indicator and a charging light that indicates when recharging is taking place. The GH2 is controlled by a microprocessor—all information on daily operation, loads, and possible irregularities is captured, to be used during service inspection. This feature ensures that wearing parts can be identified and replaced before a breakdown occurs. Because of its high process speed, the dual speed function increases lifting speed when the hoist is unloaded. This means that the overall lifting process can be carried out faster without compromising safety. Because of its small installation dimensions, lifting height is increased (almost 5 cm higher than that of DH2000). The hoist operates quietly, and patients are moved smoothly on the Guldmann rail system.

GH2+2 ceiling hoist with drive motor. The GH2+2 is a fully automatic ceiling hoist with a built-in motor for operation on the rail system. The drive motor is permanently mounted and cannot be retrofitted. It has a unique construction that allows soft start and stop. The GH2+2 has the same lifting specifications as the GH2 (max 440 lbs) and only differs by having the built-in drive motor. When using a GH2+2, note that the drive motor takes approximately 1 second to either accelerate or stop the hoist. When stopping the unit from maximum speed, the drive motor must be cut off 4–5" before the desired position.

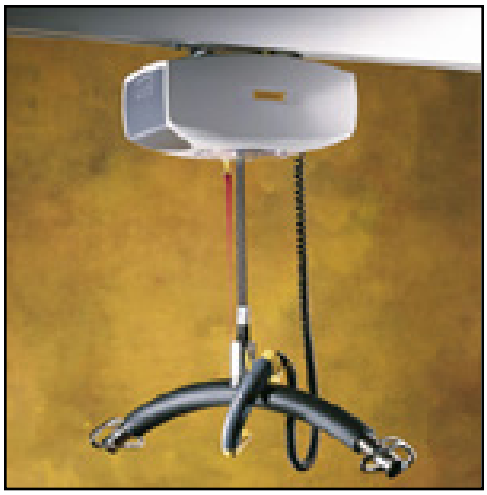

FIGURE 1. The GH2 hoist combines high capacity lifting with an attractive, discreet design. In spite of its size, the GH2 hoist can lift up to 440 lbs.

Slings. The sling is made of polyester, characterized by its strength and elasticity. It retains its shape and is dirt repellent and easy to maintain. All slings with divided leg supports have inset foam pads on the legs, which are easy to put on and smoother on the skin (Fig. 2). The suspension strap makes it easy to hang the sling up and store it. Instruction labels are attached to the sling, providing the caregiver guidance in the use of the sling. Models with a small back surface have added padding for additional comfort. If needed, there are auxiliary straps available. The color of the band on the sling indicates to the caregiver and user what type of sling they are using. All basic slings are provided with a pocket to facilitate correct positioning of the sling. The center band provides guidance for the caregiver in positioning the sling when the patient is in a supine position. The sling is easy to maintain because it can be washed at 85 °C.

The function of the trainer active sling provides support around the chest and shoulder areas. Detachable leg straps give support around the hip area (Figs. 3 and 4) and prevent the user from sliding out of the sling. This sling is most suitable for persons with reduced body balance, but they must be able to bear weight on their legs. It is great for walk training in therapy as well.

II.F. Guldmann Certification Program

The Guldmann Inc. network has one of the largest and indisputably most experienced groups of certified

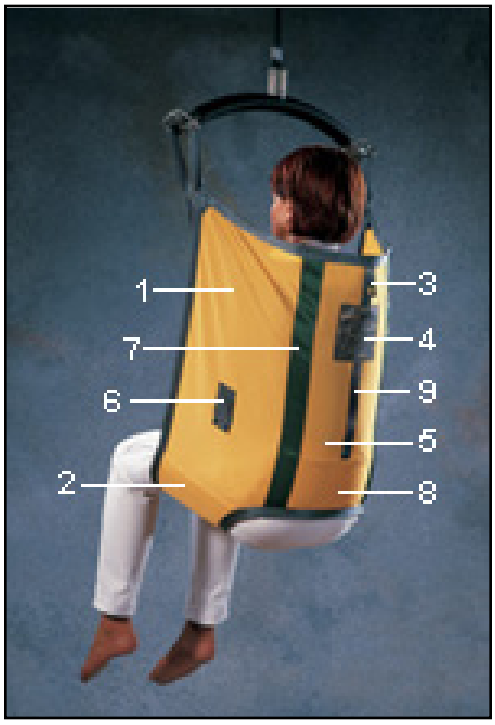

FIGURE 2. Specifications of Guldmann ABC slings:

1. **Material**—polyester characterized by its strength and elasticity. Retains its shape, is dirt repellent and easy to maintain.
2. **Padding on legs**—all slings with divided leg supports have inset foam pads on legs. Easy to put on, smoother on skin.
3. **Suspension strap**—makes it easy to hang the sling up and to store it.
4. **Instruction label**—indicates all that the healthcare worker needs to know.
5. **Padding in back section**—for added comfort on models with small back surface.
6. **Auxiliary straps**—it is possible to use auxiliary straps.
7. **Type marking**—the colour of the band identifies type of sling.
8. **Positioning pocket**—all basic slings are provided with a pocket to facilitate correct positioning of sling.

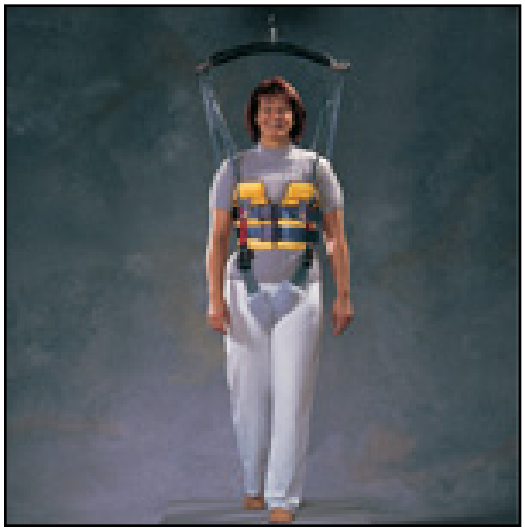

FIGURE 3. Provides support around the chest and shoulder areas. Detachable leg straps give support around the hip area and prevent the user from sliding out of the sling.

FIGURE 4. Suitable for persons with reduced body balance, but must be able to bear weight on their legs and is great for walk training.

installers in the United States. In 2003 alone, it has certified more than 25 people and trained many more for initial planning so they can earn their certification in the coming year.

Guldmann Certification is not a given just for showing up for training. It requires learning theory and practical installation of complicated ceiling lift systems. Classes are limited to two or three people to assure hands-on training and quality time with instructors. The certification is valid for 1 year. At the end of 1 year, the certificate holder will undergo a review by the certification course instructors.

The certificate holder must provide Guldmann Inc. with proof of a required minimum number of Guldmann Ceiling Lift Systems installed during that period. If the number of systems or the complexity of the systems do not meet the Guldmann standards, additional training may be required to renew certification.

The Guldmann Instructors have 3 to 12 years' experience in this industry, and they have installed more than 300 ceiling lift systems. They are on call for technical and user support over the phone, and they will also travel within the US and Canada for onsite training and support during complicated installations. Should assistance be required for its instructors, a support network is available at Guldmann R&D and the clinical trained staff.

II.G. Hospitals Using Guldmann Lift Equipment

Hospitals that have selected the Guldmann lift equipment include the following: Craig Hospital, Englewood, Colorado; Erlanger, Chattanooga, Tennessee; Legacy Emmanuel Hospital, Portland, Oregon; Magee Rehabilitation Hospital, Philadelphia, Pennsylvania; Shepherd Center, Atlanta, Georgia; Spaulding Rehabilitation Center, Boston, Massachusetts; and The Institute for Rehabilitation and Research (TIRR), Houston, Texas. These hospitals have taken this leadership approach in healthcare to ensure that their patients are lifted safely without any injury to the healthcare personnel.

III. "LIFT TEAM" METHOD

The "lift team" method was devised to remove nursing personnel from the everyday task of moving patients. This type of intervention assumes that lifting is a specialized skill to be performed only by expert professional patient movers who have been thoroughly trained in the latest lifting device techniques. These professional patient movers use mechanical lifting devices for every total-body transfer. This philosophy is based on the belief that the percentage of nursing personnel removed from lifting responsibilities is directly related to a decrease in injury and compensation dollars spent among these same personnel.[25]

Ten hospitals participated in the "lift team" study. In each of the hospitals, a reduction in major categories of back injury as a result of moving patients was reported. Lift teams were able to reliably meet the needs of the patient while removing a large number of nursing personnel from their obligation of patient lifting and transfer. This change allowed the nurses to spend more time providing patient care. All 10 hospitals reported excellent nursing satisfaction with the lift team via quality assurance questionnaires. No "downtime" was reported when a request was made for the team to make a transfer. Because of a decrease in the number of injuries as well as workers' compensation to nursing personnel during the time of intervention, a small amount of the extra monies were used to compensate members of the lift team. Therefore, the program was self-contained and succeeded in reducing OBPN. Continued evaluation of the program on a larger scale is needed.

IV. EMPLOYER/MANAGEMENT COMMITMENT

The American Nurses Association indicates that employers and managers should adopt a policy that commits the institution to the safest approach of handling and moving patients. The safest approach prioritizes the use of assistive equipment and discour-

ages the performance of manual patient handling. Organizational actions must support the use of assistive equipment for patient handling tasks by investing in an adequate supply of appropriate assistive equipment, ensuring that the equipment is readily available, and designating resource specialists skilled in the assessment and evaluation of patient handling.[26] In addition, any policy related to the elimination of manual patient handling must not be punitive. Nursing staff should be encouraged to participate and effectively implement requirements for safe patient handling and not be made fearful of reporting incidents of work-related injury. These elements are essential to ensure that a policy successfully restricting manual patient handling serves to reduce the risk of musculoskeletal disorders.

V. DISCUSSION

Several studies have determined that frequent manual lifting and/or transferring of patients is the primary causal factor of low back pain in nursing personnel.[27-30] Many nurses believe that of all job-related tasks, patient-handling activities are the most likely to result in low back pain.[31] Quantification studies have confirmed this perceived exertion, finding high levels of biomechanical stress induced by these patient-lifting and -transferring tasks.[32-34] Training in proper body mechanics has failed to have a long-term effect on the number of back injuries sustained by nursing personnel. When relying on training alone, many healthcare institutions neglect to identify and control risks.

The problem of lifting a patient is not simply one of overcoming a heavy weight. The nurse must also take into account the size, shape, and deformities of the patient, along with any physical impairments of lower limb function, as well as balance and coordination. Some patients also may be combative, contracted, or uncooperative. Any unpredictable movement or resistance from the patient may throw the nursing personnel off balance during the transfer, resulting in back injury. Space limitations, equipment interference, and unadjustable beds, chairs, and commodes may also contribute to an increase in the risk of an occupational back injury. These factors prevent nursing personnel from practicing proper body mechanics, allowing for the continued high prevalence of OBPN.

The American Nursing Association has campaigned and continues the call for a federal Occupational Safety and Health Administration standard to control hazards in the work place in an effort to prevent work-related musculoskeletal disorders.[35] A regulation that includes stipulations requiring healthcare settings to use engineering controls (i.e., assistive lift and transfer equipment) for patient-handling tasks would lead to the elimination of total manual patient handling. In the absence of a national standard, the American Nursing Association also supports efforts to undertake these regulations at a state level. It is important to emphasize that regulation and enforcement are necessary components of the overall effort to prevent work-related musculoskeletal disorders.

Once the employees leave the controlled setting of a training program, the theoretic training principles may not have application. Too many obstacles may effectively prevent good body mechanics, including the size of the room, the proximity of the bed and wheelchair, and the patient's condition. More importantly, teaching proper body mechanics does not focus on patients who are just too heavy to transfer, even with assistance.

Removing the hazard of back injuries involves implementation of innovative lifting programs, including ergonomics and the "lift team" method. Cost savings from use of the mechanical lifting equipment or lift team in high-risk departments should be used to purchase lifting equipment for other areas within the health care institution until all risks for back injury have been eliminated. The solution involves a paradigm shift from focusing on proper body mechanics to completely eliminating the risk associated with patient handling. Training alone may prepare nursing personnel for lifting tasks that are just too dangerous, even when ideal body mechanics are used.

VI. CONCLUSION

Occupational back pain in nurses (OBPN) constitutes a major source of morbidity in the health care environment. According to the National Institute for Occupational Safety and Health (NIOSH), occupational back injury is the second leading occupational injury in the United States. Among healthcare personnel, nurses have the highest rate of back pain, with an annual prevalence of 40–50% and a lifetime prevalence of 35–80%. The American Nursing Association believes that manual patient handling is unsafe and is directly responsible for musculoskeletal disorders encountered in nurses. It has been well documented that patient handling can be done safely with the use of assistive equipment and devices that eliminate these hazards to nurses that invite serious back injuries. The benefit of assistive patient handling equipment is characterized by the simultaneous reduction of the risk of musculoskeletal injury to the nursing staff and improvement in the quality of care for patient populations.

To understand the cause of disabling injuries in healthcare workers, several factors must be considered, including the anatomy/physiology of the back, risk factors, medical legal implications, and prevention. Among nurses, back, neck and shoulder injuries are commonly noted as the most prevalent and debilitating. While mostly associated with dependent patient care, the risk for musculoskeletal injury secondary to manual patient handling crosses all specialty areas of nursing. The skeletal defects of an abnormal back make the back more susceptible to occupational injury, even under normal stress conditions. Workers compensation guidelines for occupational back injury differ in public and private health care sectors from state to state. Nursing personnel should be reminded that the development of back pain following occupational activities in the hospital should be reported immediately to the Occupational Health Department. A nurse's failure to report OBPN immediately has resulted in numerous denials of claims for rehabilitation and compensation that nurses deserve. Experts believe that training in proper body mechanics does not prevent back injury. Consequently, focus has been placed on other innovative injury prevention programs, including the use of engineering controls as well as the "lift team" method. Ergonomics involves the use of mechanical devices (e.g., walking belt and mechanical hoist) to aid in patient lifting and transferring tasks.

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ACKNOWLEDGMENT

This article, highlighting revolutionary advances in back injury prevention in healthcare workers, is dedicated to the Honorable United States Representative Peter A. DeFazio, Oregon, for his instrumental leadership in developing national legislation that will prevent disabling back injuries in our nation's healthcare workers.

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